

RESEARCH PAPER

Evaluation of sapota cultivars for yield characters

N. RAMADOUSS* AND E. ARIVAZHAGAN

Department of Horticulture, Faculty of Agriculture, Annamalai University, ANNAMALAINAGAR (T.N.) INDIA

Abstract : An investigation was carried out at the Department of Horticulture, Faculty of Agriculture, Annamalai University during 2014-2015 to evaluate the performance of eight sapota cultivars, viz., PKM 1, Virudhunagar, Kirthibarthi round, Cricket ball, CO2, pala, oval and Kirthibarthi oval was studied in two seasons viz., February to April (peak season I) and July to September (peak season II). The experiment was laid out in Randomized Block Design (RBD) in three replications. Among the cultivars, CO2 had higher mean performance for yield and its components followed by Cricket ball in both seasons.

Key Words : Sapota cultivars, Yield characters

View Point Article : Ramadoss, N. and Arivazhagan, E. (2017). Evaluation of sapota cultivars for yield characters. *Internat. J. agric. Sci.*, 13 (1) : 9-13, DOI:10.15740/HAS/IJAS/13.1/9-13.

Article History : Received : 13.09.2016; Revised : 23.10.2016; Accepted : 02.12.2016

INTRODUCTION

Sapota (*Manilkara sapota*), known as sapodilla or chiku, is one of the prominent fruit species belonging to the family Sapotaceae. It is a native of Mexico and Central America and is now widely cultivated in West Indies, India, Mexico and other tropical countries. Sapodilla is grown on a commercial basis in India, Philippines, Sri Lanka, Malaysia, Mexico, Venezuela, Guatemala, and some other Central American countries. India is the largest producer of sapodilla fruit with current production area around 24,000 ha and annual production around 14,42,000 metric tons (Bijoy Kumar *et al.*, 2011). Sapota is a minor crop but of high nutritive value. It is mainly consumed in a fresh state as a table fruit in many countries where it is produced (Kute and Shete, 1995). In general, the sapota fruit requires from 100 to 165 days to mature after anthesis, depending on the cultivar, the agro climatic location and the temperature of the

environment (Sulladmath and Reddy, 2004). However, since the tree bears flowers all year round, fruits of all stages of maturity can be found on the tree at the same time, making it difficult to determine the optimum maturity date for harvesting. In addition, the climacteric nature of sapota fruits necessitates careful postharvest handling to reduce losses, further hindering the storage and distribution of sapota fruits. Characterization is an important aspect for documentation of the performance of the studied cultivars which subsequently will help to introduce, select and improve existing sapota varieties. Attempts have been made to evaluate the sapota germplasm for different agronomic traits so that recommendations for cultivation could be made in different areas. The preference of a particular cultivar in sapota varies based on the fruit shape, size and yield characters. In some areas, the consumers prefer oval or egg shaped fruits while in other parts of India, round and

* Author for correspondence:

bigger sized fruits are preferred. Developmental studies in sapota under local agro climatic conditions of this region is not available. Therefore, it was decided to undertake a systematic investigation to find out suitable cultivars with higher production and better size and quality of fruits.

MATERIAL AND METHODS

The experiment was carried out in Randomized Block Design in three replications. Healthy trees of eight cultivars grown in the orchard were identified. Three trees were selected in each variety in each replication and used for the study. Biometric observations like fruit length (cm), fruit girth (cm), fruit length: girth ratio, fruit diameter (cm), fruit volume (cc), specific gravity, mature

fruit weight (g), ripe fruit weight (g), number of seeds per fruit, weight of seeds (g), seed percentage, number of fruits per tree, number of fruits per kg, yield per tree (kg).

RESULTS AND DISCUSSION

The data presented in Tables 1 to 5 revealed that the cultivars Virudhunagar excelled the other cultivars with regard to the physical characters like fruit girth, fruit volume, mature fruit weight, ripe fruit weight, fresh weight of pulp and dry weight of pulp in both seasons followed by CO2 in which fruit length, fruit diameter and fruit length to fruit girth ratio was the highest along with lesser number of seeds per fruit and weight of seeds. The cultivar oval got the last position among different

Table 1 : Mean performance of sapota cultivars for fruit characters

Cultivars	Fruit length (cm)		Fruit girth (cm)		Fruit length to fruit girth ratio	
	Peak season I	Peak season II	Peak season I	Peak season II	Peak season I	Peak season II
PKM 1	9.03	9.00	15.50	15.46	0.54	0.53
Virudhunagar	11.36	11.04	24.33	23.05	0.46	0.45
Kirthibarthi round	9.43	9.03	19.23	18.86	0.50	0.47
Cricket ball	8.93	8.63	17.30	17.03	0.51	0.50
CO2	12.76	12.63	22.00	20.73	0.58	0.56
Pala	9.00	8.43	15.36	14.16	0.57	0.54
Oval	6.96	6.83	13.63	13.26	0.53	0.50
Kirthibarthi oval	8.93	8.43	16.33	15.26	0.52	0.51
General mean	9.55	9.25	17.96	17.22	0.53	0.50
Range	6.96-12.76	6.83-12.63	13.63-24.33	13.26-23.05	0.46-0.58	0.45-0.56
S.E.±	0.10	0.09	0.15	0.12	0.04	0.03
C.D. (P = 0.05)	0.21	0.18	0.30	0.24	0.08	0.06

Table 2 : Mean performance of sapota cultivars for fruit diameter (cm), fruit volume (cc) and specific gravity (g/cm³)

Cultivars	Fruit diameter (cm)		Fruit volume (cc)		Specific gravity (g/cm ³)	
	Peak season I	Peak season II	Peak season I	Peak season II	Peak season I	Peak season II
PKM 1	5.36	5.33	68.00	67.33	1.25	1.17
Virudhunagar	5.66	5.63	124.66	124.00	1.60	1.32
Kirthibarthi round	5.53	5.30	60.66	60.00	1.70	1.60
Cricket ball	5.26	5.23	110.00	109.66	1.02	1.01
CO2	5.93	5.76	75.33	74.33	1.80	1.79
Pala	4.10	4.06	69.00	68.66	1.01	1.00
Oval	3.56	3.40	46.66	45.33	1.86	1.81
Kirthibarthi oval	5.53	5.33	38.00	37.66	1.81	1.80
General mean	5.11	5.00	74.04	73.37	1.50	1.43
Range	3.56-5.93	3.40-5.76	38.00-124.66	37.66-124.00	1.01-1.86	1.00-1.81
S.E. ±	0.13	0.09	0.44	0.41	0.09	0.02
C.D. (P = 0.05)	0.26	0.18	0.88	0.82	0.18	0.05

Table 3 : Mean performance of sapota cultivars for fruit weight (g)

Cultivars	Mature fruit weight (g)		Ripe fruit weight (g)	
	Peak season I	Peak season II	Peak season I	Peak season II
PKM 1	85.83	79.60	82.50	77.16
Virudhunagar	200.50	189.96	192.36	186.73
Kirthibarthi round	103.00	97.43	97.26	93.13
Cricket ball	101.33	95.50	98.00	88.00
CO2	152.66	142.66	145.50	138.53
Pala	68.83	65.90	62.16	60.46
Oval	86.33	84.90	80.36	78.86
Kirthibarthi oval	101.26	97.36	99.33	89.73
General mean	112.46	106.66	107.18	101.57
Range	68.83-200.50	65.90-189.66	62.16-192.36	60.46-186.73
S.E. \pm	0.67	0.62	0.44	0.40
C.D. (P = 0.05)	1.28	1.21	0.82	0.79

Table 4 : Mean performance of sapota cultivars for seed characters

Cultivars	Number of seeds per fruit		Weight of seeds (g)		Seed percentage	
	Peak season I	Peak season II	Peak season I	Peak season II	Peak season I	Peak season II
PKM 1	4.33	4.26	3.96	3.80	4.93	4.66
Virudhunagar	4.60	4.40	4.73	4.56	2.20	1.96
Kirthibarthi round	6.20	5.46	4.93	4.76	4.83	3.83
Cricket ball	5.13	4.80	4.98	4.86	5.23	4.83
CO2	1.86	1.70	1.63	1.40	0.86	0.63
Pala	3.60	3.50	2.76	2.73	4.66	4.50
Oval	4.00	3.63	2.53	2.50	2.97	2.83
Kirthibarthi oval	3.70	3.53	3.20	2.86	4.20	3.93
General mean	4.17	3.91	3.57	3.27	3.73	3.52
Range	1.86-6.20	1.70-5.46	1.63-4.98	1.40-4.86	0.86-5.23	0.63-4.83
S.E. \pm	0.30	0.27	0.20	0.19	0.19	0.18
C.D. (P = 0.05)	0.43	0.38	0.40	0.38	0.40	0.35

Table 5 : Mean performance of sapota cultivars for fruit yield

Cultivars	Number of fruits per tree		Number of fruits per kg		Yield per tree (kg)	
	Peak season I	Peak season II	Peak season I	Peak season II	Peak season I	Peak season II
PKM 1	341.00	328.33	19.00	18.66	27.19	25.03
Virudhunagar	130.50	118.33	8.66	8.00	23.03	21.15
Kirthibarthi round	235.00	220.56	15.33	14.00	25.71	22.16
Cricket ball	280.66	269.33	9.66	9.66	28.40	25.60
CO2	218.00	214.00	9.66	9.00	33.00	30.38
Pala	310.00	303.66	16.00	12.66	21.78	19.50
Oval	186.33	180.00	18.66	17.33	16.00	14.75
Kirthibarthi oval	173.66	168.66	20.66	19.00	17.00	15.12
General mean	254.70	227.02	14.70	13.53	24.01	21.71
Range	130.50-341.00	118.33-328.33	8.66-20.66	8.00-19.00	16.00-33.00	14.75-30.38
S.E. \pm	0.32	0.31	0.50	0.47	0.25	0.21
C.D. (P = 0.05)	0.64	0.60	0.95	0.92	0.42	0.40

cultivars with regard to physical characters. Yield is the most significant trait of a cultivar as it signifies the economic importance of the crop. The number of fruits per tree is the most important yield component and influences yield directly. In the present study, the number of fruits per tree showed wide and significant differences among the cultivars and was highest in the cultivar PKM 1 in both seasons, followed by Pala and Cricket ball. With regard to fruit weight, Virudhunagar recorded the highest fruit weight of 200.50 g and 189.96 g, followed by CO2 (152.66 g and 142.66 g) and Kirthibarthi round (103.00 g and 97.43 g) in season I and II, respectively. Pala recorded the lowest fruit weight of 68.83 g and 65.90 g in both seasons. Similar variations in yield traits of different cultivars of sapota were also reported by Chundawat and Bhuva (1982); Shirol *et al.* (2007) and Kumar *et al.* (2011) in acid lime. In the present study, fruit yield per tree also varied widely among the cultivars. Cultivars CO2 and Cricket ball were found to be better yielders followed by PKM 1 and Kirthibarthi Round. The cultivars Virudhunagar and Pala were found to be medium yielders, whereas the cultivars Kirthibarthi oval and oval were found to be poor yielders. CO2 recorded the highest yield of 33.00 kg in season I and 30.38 kg in season II, followed by Cricket ball (28.40 kg and 25.60 kg) in both seasons. This might be due to the increase in number of fruits as well as size of the individual fruit that led to high yield. The differential yield ability is primarily ascribed to the number of fruits retained per shoot and fruit weight. This finding is in line with the results of Shirol *et al.* (2009) in sapota. Wide variation observed among the different cultivars with respect to yield traits may also be attributed to their genotypic differences. In addition, age of the tree is also an important factor which influences the yield. These results are in consonance with the findings of Vahora *et al.* (2010) in sapota. The results of the present study indicated that the cultivars CO2 and Cricket ball have clearly emerged as leading cultivars for yield attributes. In the present study, sapota fruits harvested in two peak seasons *viz.*, February-April and July-September were evaluated for identifying a superior cultivar for this region. Significantly higher physical and yield traits were observed during season I than season II, irrespective of the cultivars. This variability may be attributed to the climatic differences during the two seasons and also possibly due to the previous crop load affecting the following cropping levels. The overall comparison of fruit

size and yield during two seasons showed that large sized fruits which led to higher yield was observed during season I, whereas lower yield with smaller fruits were observed during season II. Fruits harvested in peak season I constituted the fruits which had set 8-10 months earlier and the fruit growth and development stage coincided with the winter season. Hence, large sized fruits produced during season I may be attributed to mild temperature, which accelerated the fruit growth. Similarly, the fruits harvested in peak season II constituted the fruits which had set 8-10 months earlier and the fruit growth and development stage coincided with the summer season. Hence, the fruits were slightly smaller during season II which may be attributed to slow growth of fruits due to high temperature with slight humidity in the atmosphere. However, the fruit size cannot be wholly attributed to season as it would also vary with the crop load and, therefore, should not be taken as variant under the influence of season as crop load would be determined by the type of conditions prevailing during fruit set and fruit development.

REFERENCES

Bijoy Kumar, N.C., Istry and Singh, Brajendra (2011). Indian horticultural database-2011, National Horticulture Board, Ministry of Agriculture, Government of India. pp. 122-123.

Chundawat, B.S. and Bhuva, H.P. (1982). Performance of some cultivars of sapota (*Acharas sapota L.*) in Gujarat. *Haryana J.Hort.Sci.*, **11**: 154-159.

Hegde, N.S. (1997). Performance of sapota [*Manilkara achras* (Mill.) Fosberg]. Varieties and hybrids under transitional tract of Karnataka. M.Sc. (Ag.) Thesis, University of Agricultural Sciences, Dharwad, KARNATAKA (INDIA) .

Kumar,M., Parthiban, S., Saraladevi, D. and Aruna, P. (2011). Evaluation of acid lime (*Citrus aurantifolia* Swingle) cultivars for yield attributes. *Asian J. Hort.*, **6** (2): 442-444.

Kute, L.S. and Shete, M.B. (1995). Sapota (Sapodilla). Handbook of fruit science and technology: production, composition, storage and processing (pp. 475-484). Marcel Dekker, NEW YORK, U.S.A.

Mone, S.V. (1989). Studies on growth and productivity of sapota [*Manilkara achras* (Mill.) Fasberg] varieties. M. Sc. (Ag.) Thesis, University of Agricultural Sciences, Dharwad, KARNATAKA (INDIA) pp. 1-88.

Shirol,A.M., Hanamashetti, S.I., Kanamadi, V.C., Thammaiah, N. and Patil, S. (2006). Performance of some sapota cultivars under Ghataprabha command area. *Karnataka J. Agric. Sci.*, **19** : 366.

Shirol, A.M., Kanamadi, V.C., Duragannavar, M.P., Thammaiah, N. and Baragimath, S.M. (2007). Studies on growth and yield performance of sapota cultivars under Arabhavi conditions. *J. Asian Hort.*, **4** (1) : 1-3.

Shirol, A.M., Kanamadi, V.C., Patil, Shankargouda and Thammaiah, N. (2009). Studies on the performance of new sapota cultivars under Ghataprabha command area. *Karnataka J. Agric. Sci.*, **22** (5) : 1056-1057.

Sulladmath, V. and Reddy, N.M.A. (2004). Studies on fruit growth and development in sapota variety Kalipatti. Ph.D. Thesis, University of Agricultural Sciences, Bangalore, KARNATAKA (INDIA).

Vahora, A.M., Tandel, Y.N. and Patel, C.B. (2010). Effect of different seasons and varieties on physical properties of sapota. *Asian J. Hort.*, **4** (2) : 440-442.

13th
Year
★★★★★ of Excellence ★★★★★